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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

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b. Identifiers/Open-Ended Terms

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Pesticide Fact Sheet

Name of Chemical: CHLORDANE
Reason for Issuance: REGISTRATION STANDARD
Date Issued: DECEMBER, 1986
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1. DESCRIPTION OF CHEMICAL

Generic Name (Chemical): 1,2,4,5,6,7,8,8-octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene

Common Name: Chlordane

Trade and Other Names: 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-4,7-methanoindan; Velsicol 1068; Velsicol 168; M-410; Belt; Chlor-Kil; Chlortox; Corodane; Gold Crest C-100; Kilex; Gold Crest C-50; Kilex; Kypchlor; Niran; Octachlor; Synchlor; Termi-Ded; Topiclor 20; Chlordan; Prentox; and Penticklor

EPA Shaughnessy Code: 058201

Chemical Abstracts Service (CAS) Number: 57-47-9

Year of Initial Registration: 1948

Pesticide Type: Insecticide

Chemical Family: Chlorinated cyclodiene

U.S. and Foreign Producers: Velsicol Chemical Corporation

2. USE PATTERNS AND FORMULATIONS

Application Sites: subsurface soil treatment for termite control; underground cables for termite control; above ground structural application for control of termites and other wood-destroying insects

Types of Formulations: emulsifiable concentrates; granular; soluble concentrates

Types and Methods of Application: trenching, rodding, subslab injection, low pressure spray for subsurface termite control; brush, spray, or dip for applying to structural wood

Application Rates: 0.5 to 2.0% emulsion for termite control; 3.0 to 4.25% solution for above ground structural wood treatment

3. SCIENCE FINDINGS

Summary Science Statement

Chlordane is a chlorinated cyclodiene with moderate acute toxicity. The chemical has demonstrated adverse chronic effects in mice (causing liver tumors). Chlordane may pose a significant health risk of chronic liver effects to occupants of structures treated with chlordane for termite control. This risk may be determined to be of regulatory concern, pending further evaluation. Chlordane is highly toxic to aquatic organisms and birds. Chlordane is persistent and bioaccumulates. Chlordane may have a potential for contaminating surface water; thus, a special study is required to delineate this potential. Applicator exposure studies are required to determine whether exposure to applicators may be posing health risks. Special product-specific subacute inhalation testing is required to evaluate the short-term respiratory hazards to humans in structures treated with chlordane. An inhalation study of one-year duration using rats is required to assess potential hazards to humans in treated residences from this route of exposure. The Agency has been apprised of reported cases of optic neuritis associated with termiticide treatment of homes. To determine whether this is a significant health effect, the registrant must have eye tissue from the latest two-year rat oncogenicity study analyzed by neuro-pathologists specializing in optic tissue pathology. Data available to the Agency show an occurrence of misuse and misapplication of chlordane. The Agency is requiring restricted use classification of all end-use products containing chlordane. Application must be made either in the actual physical presence of a Certified Applicator, or if the Certified Applicator is not physically present at the site, each uncertified applicator must have completed a State approved training course in termiticide application meeting minimal EPA training requirements

and be registered in the State in which the uncertified applicator is working.

Chemical Characteristics of the Technical Material

Physical State: Crystalline solid
Color: White
Odor: Chlorine odor
Molecular weight and formula: 409.8 - $C_{10}H_6Cl_8$
Melting Point: 95 to 96°C
Boiling point: 118°C at 0.66 mmHg (technical)
Density: 1.59 - 1.63 at 25°C
Vapor Pressure: 0.00001 mmHg at 25°C (technical)
Solubility in various solvents: Miscible with aliphatic and and aromatic hydrocarbon solvents, including deodorized kerosene; insoluble in water
Stability: Loses its chlorine in presence of alkaline reagents and should not be formulated with any solvent, carrier, diluent or emulsifier which has an alkaline reaction (technical)

Toxicology Characteristics

Acute Oral: Data gap

Acute Dermal: Data gap

Primary Dermal Irritation: Data gap

Primary Eye Irritation: Data gap (except for a 72% technical formulation)

Skin Sensitization: Not a sensitizer.

Acute Inhalation: Data gap

Subchronic Inhalation (2-week duration) using rats or guinea pigs: Data gap

Subchronic Inhalation (1-year duration) using rats: Data gap

Major routes of exposure: Inhalation exposure to occupants of treated structures; dermal and respiratory exposure to termiticide applicators.

Delayed neurotoxicity: does not cause delayed neurotoxic

effects.

Oncogenicity: This chemical is classified as a Group B_2 oncogen (probable human oncogen).

There are three long-term carcinogenesis bioassays of chlordane in mice which were independently conducted by investigators affiliated with the National Cancer Institute, the International Research and Development

Corporation, and the Research Institute for Animal Science in Biochemistry and Toxicology, Japan. Reported in these studies were significant tumor responses in three different strains of mice (IRC, CF_1, and $B6C3F_1$) in males and females with a dose-related increase in the proportion of tumors that were malignant. In Fischer 344 rats, significant tumor responses were reported in a study conducted by the Research Institute for Animal Science in Biochemistry and Toxicology.

Chronic Feeding: Based on a rat chronic feeding study with chlordane, a Lowest Effect Level (LEL) of 0.05 mg/kg/day for liver effects has been calculated.

Metabolism: Chlordane's major metabolite is oxychlordane. Oxychlordane has been found to be a major fat tissue residue in rats. Human fat samples frequently contain trans-nonachlor, a contaminant found in technical chlordane, as a major residue.

Teratogenicity: Data gap

Reproduction: Data gap

Mutagenicity: Data gap. Further testing is required in all three categories (gene mutation, structural chromosome aberrations and other genotoxic effects.

Physiological and Biochemical Characteristics

The precise mode of action in biological systems is not known. In humans, signs of acute intoxication are primarily related to the central nervous system (CNS), including

hyperexcitabilty, convulsions, depression and death.

Environmental Characteristics

Available data are insufficient to fully assess the environmental fate of chlordane. Data gaps exist for all applicable studies. However, available supplementary data indicate general trends of chlordane behavior in the environment. Chlordane is persistant and bioaccumulates. Chlordane is not expected to leach, since it is insoluble in water and should adsorb to the soil surface; thus it should not reach underground aquifers. However, additional data are necessary to fully assess the potential for ground-water contamination as a result of the termiticide use of chlordane.

Ecological Characteristics

Avian acute toxicity: LD_{50} of 83.0 mg/kg in bobwhite quail

Avian dietary toxicity (8 day): 858 ppm in mallard duck; 331 ppm in bobwhite quail; and 430 ppm in pheasant.

Freshwater fish acute toxicity (96 Hr. LC_{50}): 57 to 74.8 ug/L for bluegill; 42 to 90 ug/L for rainbow trout.

Freshwater invertebrate toxicity (48 hr. and 96 hr. EC_{50}): 15 to 590 ug/L for Pteronarcys and Daphnia, respectively.

4. Required Unique Labeling and Regulatory Position Summary

° EPA is currently evaluating the potential human health risks of 1) non-oncogenic chronic liver effects, and 2) oncogenic effects to determine whether additional regulatory action on chlordane may be warranted.

° In order to meet the statutory standard for continued registration, retail sale and use of all end-use products containing chlordane must be restricted to Certified Applicators or persons under their direct supervision. For purposes of chlordane use, direct supervision by a Certified Applicator means 1) the actual physical presence of a Certified Applicator at the application site during application, or 2) if the Certified Applicator is not physically present at the site, each uncertified applicator must have completed a State approved training course in termiticide application meeting minimal EPA training requirements and be registered in the State in which the uncertified applicator is working; the Certified Applicator must

be available if and when needed.

° In order to meet the statutory standard for continued registration, chlordane product labels must be revised to provide specific chlordane disposal procedures, and to provide fish and wildlife toxicity warnings.

° The Agency is requiring a special monitoring study to evaluate whether and to what extent surface water contamination may be resulting from the use of chlordane as a termiticide.

° Special product-specific subacute inhalation testing is required to evaluate the respiratory hazards to humans in structures treated with termiticide products containing chlordane.

° Evaluation of eye tissue from the latest two-year rat oncogenicity study is required to determine whether chlordane's termiticide use may be causing optic neuritis in humans.

° The Agency is requiring the submission of applicator exposure data from dermal and respiratory routes of exposure.

° While data gaps are being filled, currently registerd manufacturing use products and end use products containg chlordane may be sold, distributed, formulated, and used, subject to the terms and conditions specified in the Registration Standard for chlordane, and any additional regulatory action taken by the Agency. Registrants must provide or agree to develop additional data in order to maintain existing registrations.

5. TOLERANCE REASSESSMENT

No tolerance reassessment for chlordane is necessary, since there are no food or feed uses. The Agency is proceeding to revoke all tolerances and replace them with action levels. The final rule is scheduled for publication in the Federal Register in early 1987.

6. SUMMARY OF MAJOR DATA GAPS

° Hydrolysis

° Photodegradation in Water

° Aerobic Soil Metabolism

° Anaerobic Soil Metabolism

- Leaching and Adsorption/Desorption
- Aerobic Aquatic Metabolism
- Soil Dissipation
- Chronic Toxicity Studies- Rodents and Non-rodents
- Teratogenicity
- Mutagenicity Studies
- Acute Toxicity Studies
- Optic Tissue Pathology
- Special Surface Water Monitoring Studies
- Applicator Exposure Studies
- Indoor Air Exposure Studies
- Special Product-Specific Subchronic Inhalation Study (two-week duration using guinea pigs or rats)
- Subchronic Inhalation Study (One-year duration using rats)
- All Product Chemistry Studies

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